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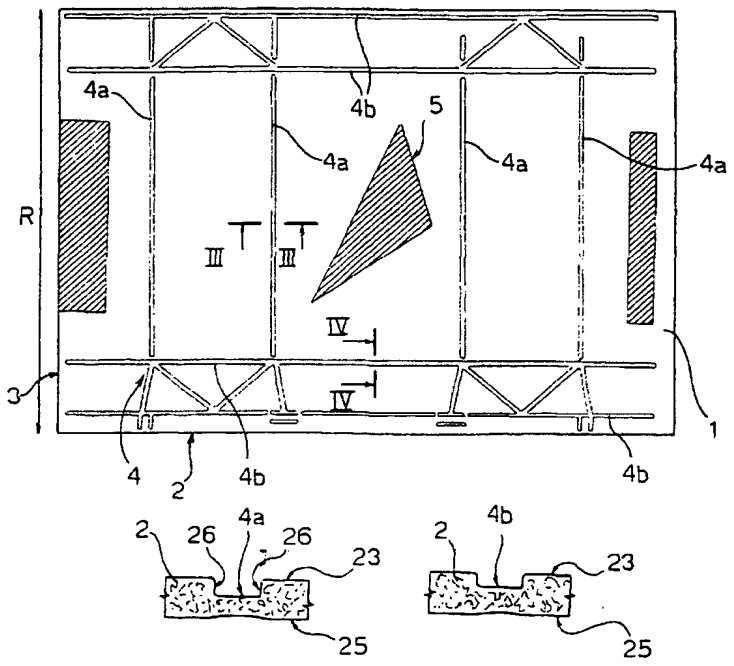
(54) Title: WEB PACKAGING MATERIAL FOR PACKAGING FOOD PRODUCTS



(57) Abstract: A web material (2) for producing packages (17) of food products and having a number of fold lines (4) formed by creasing and including longitudinal fold lines (4a) defining the vertical edges of the packages (17), and a number of transverse fold lines (4b) defining the base edges of the packages (17); the longitudinal fold lines (4a) have a lower crease strength than the transverse fold lines (4b), so as to improve formation, but without impairing the stability and strength of the packages (17).

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WEB PACKAGING MATERIAL FOR PACKAGING FOOD PRODUCTS

TECHNICAL FIELD

The present invention relates to a web material for packaging food products.

BACKGROUND ART

Materials are known for packaging pourable food products, such as fruit juice, wine, tomato sauce, pasteurized or long-storage (UHT) milk, etc.

The packages are formed from a continuous roll-fed web of packaging material, which may be cut to form blanks or longitudinally sealed to form a tube of packaging material.

The packaging material has a multilayer structure comprising a layer of paper material covered on both sides with layers of heat-seal material, e.g. polyethylene, and, in the case of aseptic packages for long-storage products, such as UHT milk, also comprises a layer of barrier material defined, for example, by an aluminium foil, which is superimposed on a layer of heat-seal plastic material and in turn covered with another layer of heat-seal plastic material eventually defining

the inner face of the package contacting the food product.

To produce aseptic packages, the web of packaging material is unwound off a reel and fed through an aseptic chamber in which it is sterilized, e.g. by applying a sterilizing agent such as hydrogen peroxide, which is later vaporized by heating and/or by subjecting the packaging material to radiation of appropriate wavelength and intensity.

The sterilized web is then folded into a cylinder and sealed longitudinally to form, in known manner, a continuous, vertical, longitudinally sealed tube. The tube of packaging material, in other words, forms an extension of the aseptic chamber, and is filled continuously with the pourable food product and then fed to a form-and-seal unit for forming the individual packages and on which pairs of jaws grip and seal the tube transversely to form pillow packs.

The pillow packs are then separated by cutting the sealing portion between the packs, and are fed to a final folding station where they are folded mechanically into the shape of the finished packages.

The packages are formed by folding the packaging material along fold lines "creased" into the material.

More specifically, the web has longitudinal fold lines for defining the vertical edges of the packages; and transverse fold lines for defining the base edges of the packages and for also folding the material along the

transverse seals.

Creasing is performed by two creasing rollers having respective work surfaces with respective raised and recessed lines perfectly aligned to subject the material locally to deformation having a substantially U-shaped cross section, and with substantially no change in the thickness of the material.

The height of the projections on the creasing roller defines the depth of the fold lines and, hence, their crease strength, which is defined by a parameter normally referred to as RCS (Relative Crease Strength, measured in relation to the crease strength of the material with no fold lines). The deeper the fold lines are, the lower their crease strength, and hence RCS, is.

Determining creasing depth is normally a trade-off between the conflicting requirements of forming the package easily, and achieving strength and stability of the finished package.

That is, excessively deep fold lines make formation easier, but result in weak or unstable packages; whereas shallow fold lines provide for strength and stability, but make the packages difficult to form.

The problem is further compounded by the fibers in the paper layer of the material (hereinafter referred to as "paper" for the sake of simplicity) normally being oriented longitudinally, i.e. parallel to the feed direction of the material on the machine, so that, for a given depth, the transverse fold lines have a lower RCS

than the longitudinal ones, on account of transverse creasing breaking the paper fibers.

Since the transverse fold lines are those which account mostly for the strength and stability of the package, creasing depth, to be on the safe side, is normally determined on the basis of these, at the expense of easy formation of the packages.

DISCLOSURE OF THE INVENTION

It is an object of the present invention to provide a packaging material with none of the aforementioned drawbacks typically associated with known materials.

According to the present invention, there is provided a web material for producing packages of food products and having a number of fold lines formed by creasing and comprising longitudinal fold lines defining the vertical edges of the packages, and a number of transverse fold lines defining the base edges of the packages; characterized in that said longitudinal fold lines have a lower crease strength than the transverse fold lines.

The material according to the invention provides for easy formation, by virtue of the weaker longitudinal fold lines, and at the same time for excellent structural characteristics of the finished packages, by virtue of the stronger fold lines defining the base edges of the packages.

Conventional creasing also poses further problems.

Firstly, the equipment required is extremely

expensive, owing to the high degree of precision involved in producing the work surfaces of the creasing rollers to ensure they mate perfectly and do not damage the material.

Secondly, local delamination of the material may occur when folding the material along the fold lines to form the packages.

According to a preferred embodiment of the invention, the fold lines are formed by compression creasing, and have a recessed profile on one face of the material, and a nonconvex profile on an opposite face.

As such, the fold lines may be formed using a creasing roller with projections, and a reaction roller having a smooth work surface, i.e. without the recesses which, in conventional creasing, act as a "die" for the projections on the other roller. The cost of the creasing equipment is thus greatly reduced.

Moreover, since the material is creased by straightforward compression as opposed to cutting action, the problems and hazards posed by delamination are reduced.

BRIEF DESCRIPTION OF THE DRAWINGS

A number of non-limiting embodiments of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows, schematically, a machine for producing aseptic packages from a web of web material in accordance with the present invention;

Figure 2 shows a portion of a web packaging material in accordance with the present invention;

Figure 3 shows a schematic section, along line III-III in Figure 2, illustrating the profile of a first fold line in the Figure 2 material;

Figure 4 shows a schematic section, along line IV-IV in Figure 2, illustrating the profile of a second fold line in the Figure 2 material;

Figure 5 shows a schematic section of a step in the material fabrication method for obtaining the Figure 3 fold line;

Figure 6 shows a schematic section of a step in the material fabrication method for obtaining the Figure 4 fold line;

Figure 7 shows a schematic section of a step in the material fabrication method for obtaining the Figure 3 fold line according to a variation of the invention;

Figure 8 shows a schematic section of a step in the material fabrication method for obtaining the Figure 4 fold line according to the variation embodiment.

BEST MODE FOR CARRYING OUT THE INVENTION

Number 1 in Figure 2 indicates a portion of a web packaging material 2 fed in the form of a continuous web 3.

Web 3 of material 2 comprises a number of fold lines, indicated as a whole by 4, and a printed decoration 5, which are repeated at intervals R equal to the length of paper required to produce one package.

Web 3 can be used on a machine 6, shown schematically in Figure 1, for producing aseptic packages, and on which web 3 is unwound off a reel 7 and fed through an aseptic chamber (not shown), where it is sterilized, and through an assembly 8 by which it is folded and sealed longitudinally to form, in known manner, a continuous vertical tube 9.

Tube 9 of packaging material is filled continuously with the pourable food product by means of a known filling device 10, and is then fed to a forming and transverse sealing station 14 where it is gripped between pairs of jaws (not shown) which seal the tube transversely to form pillow packs 15.

Pillow packs 15 are then separated by cutting the sealing portion between the packs, and are fed to a final folding station 16 where they are folded mechanically to form the finished packages 17.

The packages are formed by folding the material along fold lines 4, and by controlling material feed by means of an optical sensor 16 for "reading" register marks 18 located on the material at intervals R.

Fold lines 4 are formed by means of a creasing process, and comprise longitudinal fold lines 4a defining the vertical edges of finished packages 17, and transverse fold lines 4b defining the base edges of packages 17.

According to the present invention, the crease strength of longitudinal fold lines 4a is less than that

of transverse fold lines 4b, and the difference is achieved by appropriately varying creasing depth as described in detail below.

The relative crease strength (RCS) of longitudinal lines 4a, i.e. the ratio between the crease strength of lines 4a and that of material 2 with no fold lines, conveniently ranges between 55% and 65%, and is preferably 65%; and the RCS of lines 4b conveniently ranges between 65% and 75%, and is preferably about 70%.

The difference in the RCS of transverse lines 4b and longitudinal lines 4a therefore conveniently ranges between 2% and 20%, and is preferably 10%.

According to a preferred embodiment of the invention, fold lines 4a, 4b (Figures 5 and 6) are preferably defined by compression lines formed by means of a compression creasing process, i.e. in which material 2 is compressed between a creasing roller 20 - having a number of projections 21a, 21b corresponding with compression lines 4 - and a smooth reaction roller 22, i.e. with no cavities corresponding with projections 21a, 21b.

The profiles of rollers 20, 22, in plan form, are shown partly and schematically in Figures 5 and 6, which clearly show the greater height of projections 21a with respect to projections 21b to achieve the difference in the crease strength of lines 4a and 4b.

In this way, the packages can be formed easily, while at the same time achieving good strength and

stability.

Conveniently, roller 20 operates on the face 23 of the material defining the outer surface of the package, i.e. on which decoration 5 is printed, and roller 22 on the opposite face 25.

As shown clearly in Figures 3 and 4, compression lines 4a, 4b have a recessed profile, defined laterally by step sides 26, on face 23 of material 2, and a substantially flat or slightly concave profile on the opposite face 25.

Figures 7 and 8 show a variation embodiment of the invention, in which creasing is performed using a conventional method.

In this case, creasing is performed by two creasing rollers 30, 31 having respective work surfaces with perfectly aligned projections 32a, 32b and recesses 33a, 33b respectively, so as to subject the material locally to a double crease with a substantially U-shaped profile in cross section. In this case, too, creasing depth is greater for lines 4a than lines 4b.

Clearly, changes may be made to material 2 as described herein without, however, departing from the scope defined in the accompanying Claims.

CLAIMS

1) A web material (2) for producing packages (17) of food products and having a number of fold lines (4) formed by creasing and comprising longitudinal fold lines (4a) defining the vertical edges of the packages, and a number of transverse fold lines (4b) defining the base edges of the packages (17); characterized in that said longitudinal fold lines (4a) have a lower crease strength than the transverse fold lines (4b).

2) A material as claimed in Claim 1, characterized in that the difference between the relative crease strength of said transverse fold lines (4b) and that of said longitudinal fold lines (4a) ranges between 2% and 20%.

3) A material as claimed in Claim 1 or 2, characterized in that the difference between the relative crease strength of said transverse fold lines (4b) and that of said longitudinal fold lines (4a) is about 10%.

4) A material as claimed in any one of the foregoing Claims, characterized in that said longitudinal fold lines (4a) have a relative crease strength ranging between 55% and 65%; and in that said transverse fold lines (4b) have a relative crease strength ranging between 65% and 75%.

5) A material as claimed in any one of the foregoing Claims, characterized in that said fold lines (4) are compression lines having a recessed profile on a first

face (23) of said material (2), and a nonconvex profile on a second face (25) of said material (2).

6) A method of producing a web material (2) for packaging food products and having a number of fold lines (4), the method comprising a creasing step in which a web (3) of said material is compressed between a first and a second creasing roller (20, 22; 30, 31) acting on opposite faces (23, 25) of the material (2); said first roller (20; 30) having a first number of projections (21a; 32a) for generating fold lines (4a) longitudinally with respect to said web (3), and a second number of projections (21b; 32b) for generating fold lines (4b) transversely with respect to said web (3); characterized in that the projections (21a; 32a) in said first number are higher than the projections (21b; 32b) in said second number.

7) A method as claimed in Claim 6, characterized in that said second creasing roller (22) has a smooth work surface.

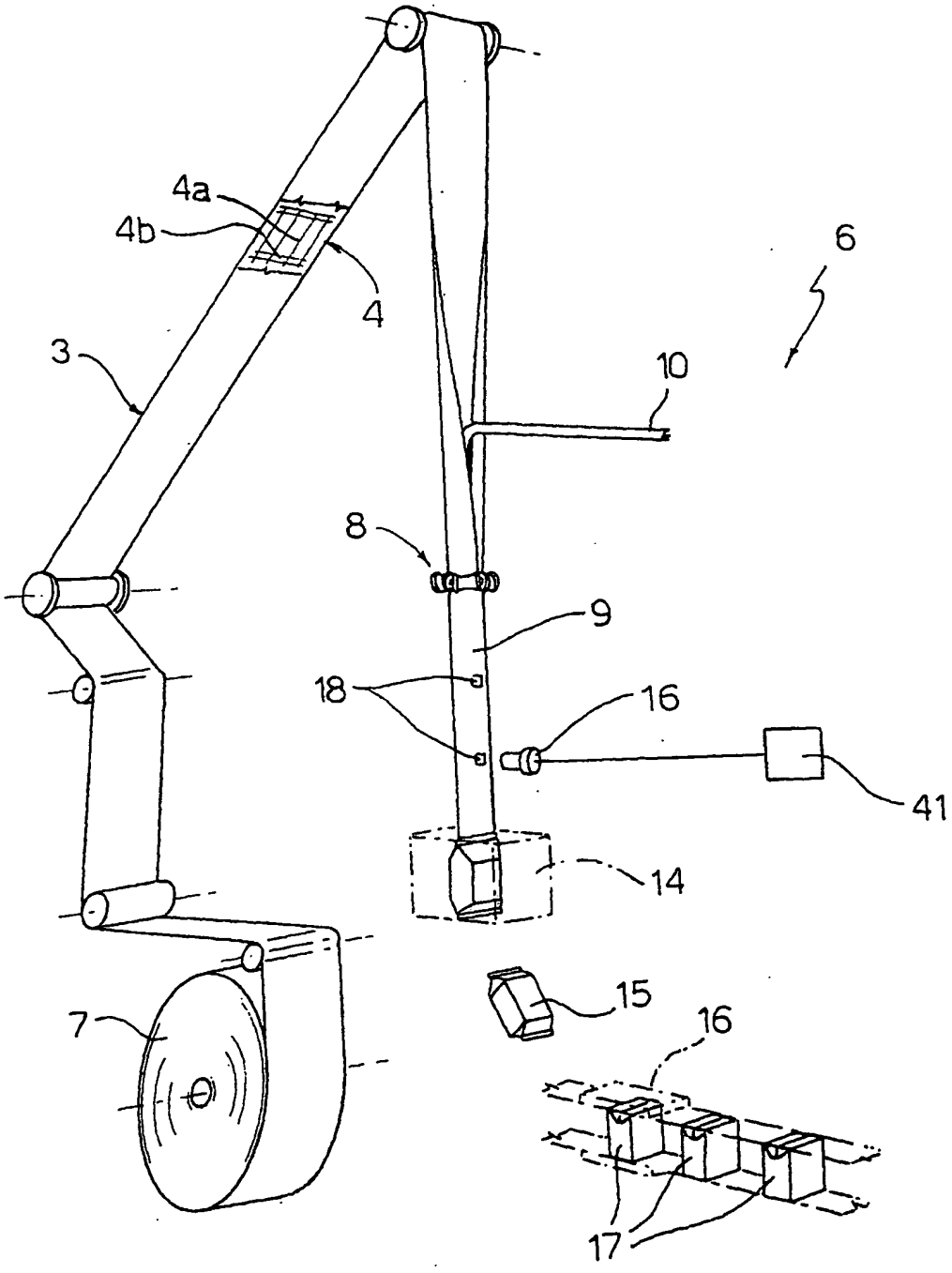

Fig.1

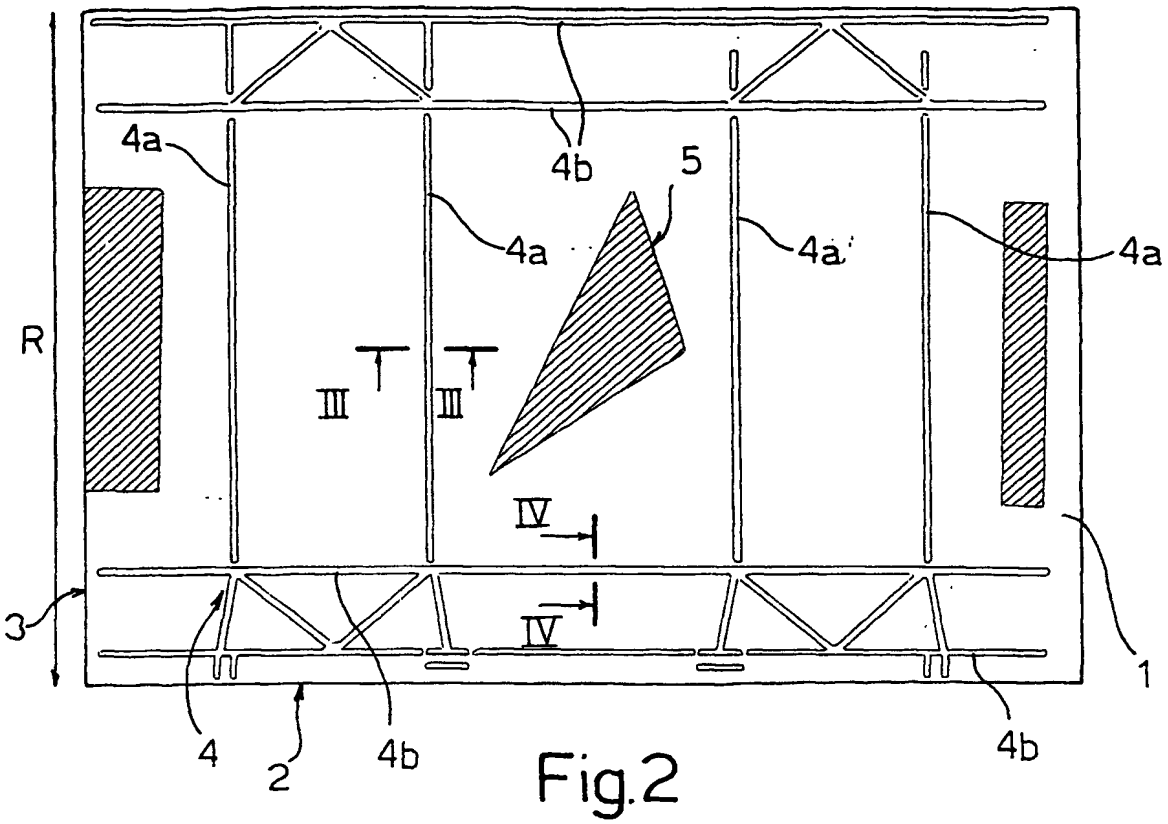

Fig.2

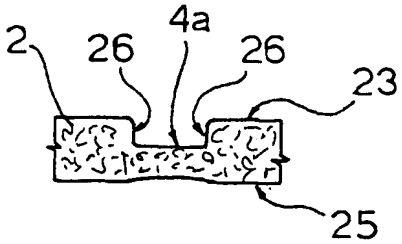

Fig.3

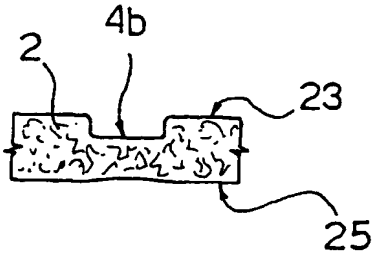

Fig.4

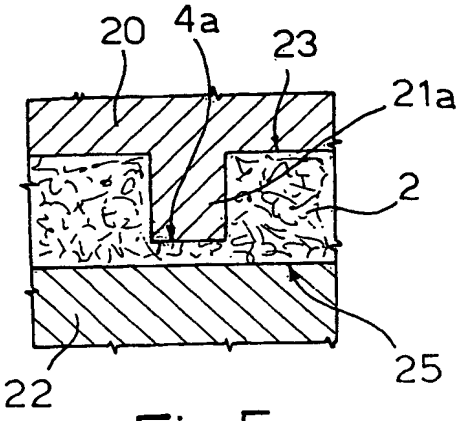

Fig.5

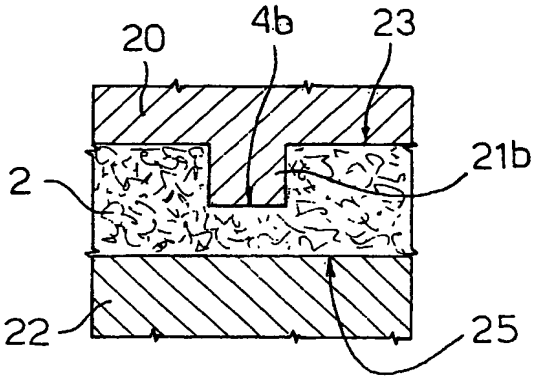

Fig.6

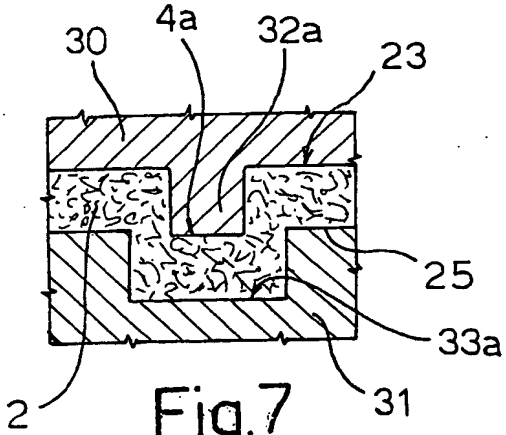

Fig.7

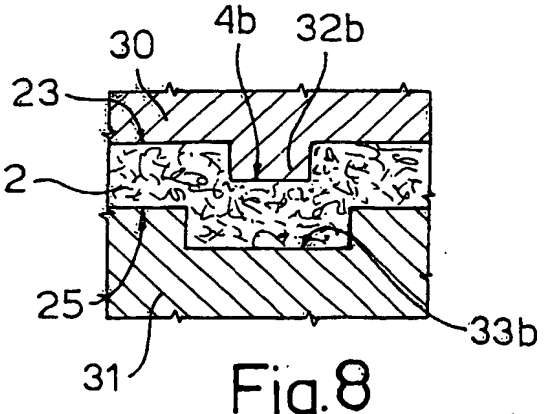

Fig.8

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 02/12208

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65D5/42 B31B1/25

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B65D B31B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 704 886 A (SAMPAOLO) 6 January 1998 (1998-01-06) column 6, line 13 -column 7, line 62; figures 1-5,14-17	1,6
A	EP 0 936 150 A (TETRA LAVAL) 18 August 1999 (1999-08-18) column 8, line 3 -column 9, line 21; figures 1-9	1
A	DE 100 47 447 A (SOCIETA PER AZIONI) 17 May 2001 (2001-05-17) column 2, line 54 -column 4, line 48; figures 1-4	1,6
A	US 4 816 015 A (HOLDER) 28 March 1989 (1989-03-28)	

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

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Date of the actual completion of the international search	Date of mailing of the international search report
19 February 2003	27/02/2003

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,	Martens I

INTERNATIONAL SEARCH REPORT

Information on patent family members

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